

WHAT IS CLAIMED IS:

1. An air conditioning system for conditioning supply air conducted to an enclosed space comprising:

a refrigerant fluid circuit including a condenser heat exchanger and an evaporator heat exchanger operably
5 connected for circulating a refrigerant fluid;

a supply air reheat heat exchanger disposed downstream of said evaporator heat exchanger with respect to the direction of supply air flow through said evaporator heat exchanger and said reheat heat exchanger;

10 a blower for conducting supply air through said evaporator heat exchanger and said reheat heat exchanger to supply conditioned air to said space;

a humidity sensor for sensing the humidity in said enclosed space; and

15 a controller for controlling flow of heat exchange medium through said condenser heat exchanger whereby dehumidification of supply air flowing to said enclosed space may be controlled by the amount of heat exchange carried out by said reheat heat exchanger and said condenser
20 heat exchanger, respectively.

2. The system set forth in Claim 1 including:

a control valve for selectively controlling refrigerant fluid to flow directly from said condenser heat exchanger to said evaporator heat exchanger and from said
5 condenser heat exchanger to said reheat heat exchanger and then to said evaporator heat exchanger.

3. The system set forth in Claim 2 wherein:
said refrigerant fluid circuit includes a
compressor for compressing refrigerant fluid discharged from
said evaporator heat exchanger and for conduction to said
5 condenser heat exchanger.

4. The system set forth in Claim 2 wherein:
said heat exchange medium comprises air and said
system includes a fan disposed for propelling air through
said condenser heat exchanger.

5. The system set forth in Claim 4 wherein:
said fan is driven at variable speed by a motor
operably connected to said controller.

6. The system set forth in Claim 1 including:
a bypass conduit for bypassing refrigerant fluid
in said circuit around said condenser heat exchanger when
fluid flow restriction increases as reduced heat exchange
5 takes place therein between said refrigerant fluid and said
heat exchange medium.

7. The system set forth in Claim 6 including:
a pressure relief valve disposed in said bypass
conduit for controlling refrigerant fluid pressure at which
refrigerant fluid bypasses said condenser heat exchanger.

8. The system set forth in Claim 2 including:
a damper for controlling the flow of supply air to
provide for bypassing at least a portion of supply air
around said evaporator heat exchanger and said reheat heat
5 exchanger.

9. The system set forth in Claim 8 including:
an actuator connected to said damper and to said
controller for selectively controlling the amount of supply
air flowing through said system to bypass said evaporator
5 heat exchanger and said reheat heat exchanger.

10. The system set forth in Claim 2 wherein:
said refrigerant circuit includes a flow reversing
valve disposed between a compressor for compressing said
refrigerant fluid, said condenser heat exchanger and said
5 evaporator heat exchanger for selectively operating said
system for cooling and dehumidifying said supply air and for
heating said supply air, depending on the position of said
reversing valve.

11. The system set forth in Claim 2 including:
control valves in said refrigerant fluid circuit
for controlling flow of refrigerant fluid to and from said
reheat heat exchanger wherein in a first mode of operation
5 of said system for cooling supply air flowing through said
evaporator heat exchanger refrigerant fluid bypasses said
reheat heat exchanger, and in a second mode of operation of
said system for cooling and dehumidifying supply air
refrigerant fluid is circulated from said condenser heat
10 exchanger, through said reheat heat exchanger and then
through said evaporator heat exchanger.

12. The system set forth in Claim 11 wherein:
said refrigerant fluid circuit includes a flow
direction reversing valve and in a third mode of operation
refrigerant fluid flows through said evaporator heat
5 exchanger, then through said reheat heat exchanger and then
through said condenser heat exchanger.

13. The system set forth in Claim 1 including:

a further heat exchanger disposed in said refrigerant fluid circuit between said condenser heat exchanger and said evaporator heat exchanger; and

5 said reheat heat exchanger is in circuit with said further heat exchanger for circulating a fluid therebetween to effect reheat of supply air to control humidity in said space.

14. The system set forth in Claim 1 including:

a refrigerant fluid charge compensator operably connected to said refrigerant fluid circuit for storing a portion of said refrigerant fluid.

15. An air conditioning system for controlling the temperature and humidity of supply air furnished to an enclosed space, said system comprising:

5 a refrigerant fluid circuit including a compressor operable to compress refrigerant fluid vapor and operable to be connected to a condenser heat exchanger, a reheat heat exchanger and an evaporator heat exchanger for circulating refrigerant fluid therethrough;

10 a supply air blower for conducting supply air through said evaporator heat exchanger and said reheat heat exchanger to said enclosed space;

a fan for conducting a controlled amount of ambient outdoor air over said condenser heat exchanger;

15 control valves for selectively controlling flow of refrigerant fluid through said reheat heat exchanger;

temperature and humidity sensors for sensing the temperature and humidity of air in said enclosed space; and

20 a controller operably connected to said compressor and said fan for causing refrigerant fluid to flow through said condenser heat exchanger and said evaporator heat exchanger, for actuating said control valves to selectively control flow of refrigerant fluid through said reheat heat exchanger and for controlling flow of air over said condenser heat exchanger to selectively control the
25 temperature and humidity in said enclosed space.

16. The system set forth in Claim 15 including:

a motor drivably connected to said fan for controlling the flow of air over said condenser heat exchanger.

17. The system set forth in Claim 16 wherein:
said motor is a variable speed motor.

18. The system set forth in Claim 16 wherein:
said compressor, said condenser heat exchanger,
said fan and said fan motor comprise an outdoor portion of
said system and said system may be provided by replacing an
5 indoor portion of a prior system without replacing, adding
or deleting a portion of said refrigerant fluid circuit that
extends between an indoor portion of said system and said
outdoor portion of said system.

19. The system set forth in Claim 15 including:
a reversing valve operably disposed in said
refrigerant fluid circuit for reversing the direction of
flow of fluid to cause fluid to flow from said compressor to
5 said evaporator heat exchanger, then to said reheat heat
exchanger and then to said condenser heat exchanger.

20. A heat pump air conditioning system for controlling the temperature and humidity of supply air to an enclosed space, said system comprising:

5 a refrigerant fluid circuit including a flow direction reversing valve, a compressor operable to conduct compressed refrigerant fluid vapor to a condenser heat exchanger, a reheat heat exchanger and an evaporator heat exchanger for circulating refrigerant fluid therethrough;

10 a supply air blower for conducting supply air through said evaporator heat exchanger and said reheat heat exchanger to said enclosed space;

a variable speed fan for conducting a controlled amount of ambient outdoor air over said condenser heat exchanger;

15 control valves for selectively controlling flow of refrigerant fluid through said reheat heat exchanger; and

temperature and humidity sensors for sensing the temperature and humidity of air in said enclosed space whereby refrigerant fluid is caused to flow through said
20 condenser heat exchanger, said reheat heat exchanger and said evaporator heat exchanger and flow of air over said condenser heat exchanger is varied to selectively control the temperature and humidity in said enclosed space by varying the heat exchange with refrigerant fluid flowing
25 through said condenser heat exchanger and said reheat heat exchanger.

21. The system set forth in Claim 20 including:

a variable speed motor drivably connected to said fan.

22. The system set forth in Claim 20 including:

a controller operably connected to said reversing valve for actuating said reversing valve to cause refrigerant fluid to flow from said compressor to said evaporator heat exchanger, then to said reheat heat exchanger and then to said condenser heat exchanger.